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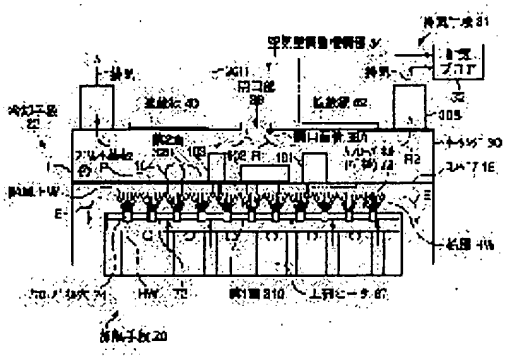
(54) APPARATUS AND METHOD FOR SOLDERING

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an apparatus and method for soldering components, wherein solder zones on a board can be efficiently heated with adequately cooling non heat-resistant components mounted on the board.

SOLUTION: This apparatus heats soldering parts of non heat-resistant components 101-104 for electrically connecting them to a board P and has a means 20 for heating the soldering parts of the non heat-resistant components 101-104 on the board P with hot air fed to the entire first plane 310 and a means 22 for cooling a second plane 320 of the non heat-resistant components 101-104. The cooling means 22 is provided with an air flow rate regulator mechanism for adjusting the air flow rate for cooling the non heat-resistant components 101-104 by controlling the opening area for taking air from the outside.



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* NOTICES *

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the soldering equipment and the soldering approach of heating the soldering section of a substrate, in order to connect the components and solder of a substrate electrically.
[0002]
[Description of the Prior Art] The electronic equipment for constituting various circuits is mounted to the substrate with which the various circuits of electronic equipment are constituted, for example, a printed circuit board, (it is also called a printed wired board). As a format of mounting of this kind of electronic parts, there are insertion mounting (lead components etc.) and surface mounts (chip etc.), for example. Although the mounted electronic parts connect electrically with soldering to the wiring section of a printed circuit board, as a method of such soldering, the flow solder method and the reflow solder method are learned. A flow solder method is a method which lets a substrate pass in the solder tub to which melting of the solder is carried out. A reflow solder method is a method which heats the soldering part of a printed circuit board in a reflow furnace, after applying cream solder etc. to the predetermined part of a printed circuit board.
[0003] However, the miniaturization of the components which it is going to mount progresses and it is required that packaging density of electronic parts should be made high to the component-side product of a printed circuit board. For this reason, naturally spacing of the connection terminal currently drawn from the mounting components in a printed circuit board is also narrow. If the flow solder method mentioned above is adopted, the bridge of solder will become is easy to be formed between the narrow connection terminals of spacing. Since it is such, when soldering in the printed circuit board which mounts the electronic parts of high density, the reflow solder method is mainly adopted.
[0004] By the way, although various components equipped with various heat-resistant specification are mounted on one printed circuit board, the mounting components which can solder to one printed circuit board with a flow solder method, and the part which cannot solder skillful ****** components unless it is a reflow solder method may exist. That is, it is necessary to use a flow solder method and a reflow solder method properly according to the class of electronic parts which are going to mount on the printed circuit board of one sheet. For example, the lead components (for example, a transformer, semipermanent volume, an air-core coil, a chemical capacitor, etc.) of non-thermal resistance solder to a printed circuit board with flow soldering, and the components with thermal resistance like chips, such as an air-core coil and IC (integrated circuit) package, solder to a printed circuit board by reflow soldering.
[0005] Drawing 11 shows the example of the reflow furnace of a spot type used conventionally. The lead components 1001-1004 of non-thermal resistance are already carried in the top-face 1000 side of printed circuit board P, and the connection terminal of these lead components 1001-1004 has projected to the rear-face 1005 side of printed circuit board P. The hot blast 1008 of the hot blast generator 1006 in the reflow furnace 1007 blows off from a nozzle 1009 in the location corresponding to the connection terminal of each lead components 1001-1004, and heats the solder 1010 located in those connection terminals. Thus, it is necessary to set beforehand each nozzle 1009 of the conventional reflow furnace

1007 as the location corresponding to the solder 1010 of each connection terminal of the lead components 1001-1004 of printed circuit board P.
[0006] Drawing 12 shows an example of the process which solders at the reflow furnace shown by drawing 11 . In drawing 12 (A), the transistor 1011 and IC1012 which are heat-resistant components are already attached in the field 1005 of printed circuit board P using cream solder etc. A multi-dispenser (nozzle) is used for a substrate and cream solder is applied to a lead section land. As shown in drawing 12 (B) and drawing 12 (C), it is reversed and this printed circuit board P mounts the lead components 1001 and 1002 grades which are non-heatproof components to a top face 1000.
[0007] Next, as shown in drawing 12 (D), solder is melted and soldered from an inferior-surface-of-tongue 1005 side using the nozzle 1009 of the reflow furnace 1007 as shown by drawing 11 by spouting hot blast to the solder 1021 of the connection terminal 1020 of the lead components 1001 and 1002. Thus, being equipped with electronic parts of a non-heatproof like lead components and heat-resistant electronic parts like a transistor or IC to the printed circuit board of one sheet is realizing the circuit (for example, a tuner circuit and IF circuit) of the high frequency device part for television receivers by the printed circuit board of one sheet, and it is performed in order to improve productivity and to attain a miniaturization. That is, it is going to realize conventionally what has the required printed circuit board, the printed circuit board in which the electronic parts of non-thermal resistance were carried, and the printed circuit board in which heat-resistant electronic parts were carried, of a total of two sheets by the printed circuit board of one sheet.
[0008] However, when a reflow furnace of a spot type which was mentioned above is used, there are the following problems. As mentioned above, if the formats of printed circuit board P differ, the nozzle 1009 of drawing 11 has this nozzle panel (reflow panel) 1009A naturally remade, and since it is prepared in nozzle panel 1009A corresponding to arrangement of the connection terminal of the lead components of printed circuit board P, if it is ******, there is. [no] Moreover, if the formats of printed circuit board P differ, such nozzle panel 1009A must remove from the reflow furnace 1007, and must be exchanged for new nozzle panel 1009A, but since it is high temperature, the problem on an activity arises. Since hot blast must be supplied on the same temperature conditions to the solder of the connection terminal of each lead component, it is difficult to carry out such conditioning, and the man day for conditioning starts, and when skillful ****** conditions are not ready, exchange of nozzle panel 1009A will be needed. Since it is located near the solder of a connection terminal, and solder is fallen and got blocked in the hole of this nozzle and reflow temperature falls partially, a nozzle 1009 has check and very troublesome maintenance control.
[0009]
[Problem(s) to be Solved by the Invention] By the way, at a reflow furnace which was mentioned above, while heating the inferior-surface-of-tongue 1005 side shown in drawing 11 by hot blast, it is necessary to cool the top-face 1000 side with the lead components which are non-heatproof components. It is necessary to cool the lead components by the side of a top face 1000 efficiently according to the number of loading of the lead components which are non-heatproof components carried to the top face 1000 of printed circuit board P at this time, the temperature conditions of the hot blast from the reflow furnace 1007, etc. Then, this invention cancels the above-mentioned technical problem, and it aims at offering the soldering equipment which can heat the soldering section of a substrate efficiently, and the soldering approach, cooling efficiently the components of non-thermal resistance carried in the substrate.
[0010]
[Means for Solving the Problem] If the above-mentioned purpose is in this invention, it is soldering equipment which heats the soldering section of the components of non-thermal resistance in order to connect the components of non-thermal resistance of a substrate electrically. A heating means to supply and heat hot blast extensively to the 1st page side by the side of the soldering section of the components of non-thermal resistance of a substrate, It has a cooling means to cool the 2nd page side which is a field in which the components of non-thermal resistance of a substrate were carried. A cooling means It is attained by the soldering equipment characterized by having the air content adjustment device section for adjusting the air content for cooling the components of non-thermal resistance taken in from the

outside in opening area.
[0011] In case the soldering section of the components of non-thermal resistance is heated in order to connect the components of non-thermal resistance of a substrate electrically if the above-mentioned purpose is in this invention, while supplying and heating hot blast extensively to the 1st page side by the side of the soldering section of a substrate In case the 2nd page side which is a field in which the components of non-thermal resistance of a substrate were carried is cooled, it is attained by the soldering approach characterized by adjusting the air content for cooling the components of non-thermal resistance taken in from the outside in opening area.
[0012] In this invention, in order to connect the components of non-thermal resistance of a substrate electrically, in case the soldering section of a substrate is heated, a heating means supplies and heats hot blast extensively to the 1st page side by the side of the soldering section of a substrate. In case the soldering section is heated with such a heating means, a cooling means cools the 2nd page side which carried the components of non-thermal resistance of a substrate. This cooling means has the air content adjustment device section which can adjust the air content for cooling the components of non-thermal resistance taken in from the outside in opening area. In case a heating means heats extensively the 1st page by the side of the soldering section by hot blast efficiently and melts solder by this, the air content adjustment device section of a cooling means can cool the components of non-thermal resistance efficiently according to conditions, such as the number of loading of the components of non-thermal resistance, by adjusting the air content for cooling taken in from the outside in opening area.
[0013] In this invention, preferably, the cooling means has the exhaust air means, in order to supply the air for external cooling to the 2nd page side of a substrate by exhausting the inside of casing. Thereby, according to the opening area adjusted in the air content adjustment device section, an exhaust air means can adopt the air for cooling in casing. In this invention, if the heating means is preferably equipped with the panel which has many holes, it can heat by hot blast to homogeneity extensively [the soldering section side of the components of non-thermal resistance of a substrate] the 1st page. And by letting air pass to a heater by actuation of fan equipment, hot blast can be supplied to the 1st page side of a substrate in homogeneity on the whole through the hole of this panel.
[0014] In this invention, if a heater is preferably equipped with the 1st heater and the 2nd heater, the heating capacity of air can be heightened. In this invention, the air content adjustment device section of a cooling means can adjust opening area by moving a heat-resistant shield preferably. This shield has giving [little] to the components of non-thermal resistance compared with a metal shield by making the heat from a heating means into radiant heat by making with heat-resisting glass preferably.
[0015]
[Embodiment of the Invention] Hereafter, the gestalt of suitable operation of this invention is explained to a detail based on an accompanying drawing. In addition, since the gestalt of the operation described below is the suitable example of this invention, desirable various limitation is attached technically, but especially the range of this invention is not restricted to these gestalten, as long as there is no publication of the purport which limits this invention in the following explanation.
[0016] Drawing 1 shows the gestalt of desirable operation of the soldering equipment of this invention, and this soldering equipment can be preferably used for it as a reflow furnace. The soldering equipment of drawing 1 has the preheating section 10, the reflow section 12, the cooling section 14, and conveyor 16 grade. Beforehand, as shown in drawing 2 and drawing 9 (D), various predetermined components are carried in printed circuit board P. This printed circuit board P is discharged in the direction of arrow-head T from the induction 11 of a conveyor 16 through the preheating section 10, the reflow section 12, and the cooling section 14. That is, sequential arrangement of the preheating section 10, the reflow section 12, and the cooling section 14 is carried out along the flow direction of a conveyor 16.
[0017] The preheating section 10 is explained first. This preheating section 10 is a part which carries out preheating of the printed circuit board P. The preheating section 10 has 1st preheating section 10A, 2nd preheating section 10B, and 3rd preheating section 10C. The 1st preheating sections 10A-10C of the preheating section 10 can be heated going up gradually from a room temperature to predetermined temperature over a three-stage to printed circuit board P introduced one by one. That is, this preheating

section 10 activates reflow solder to coincidence, without giving stress to the electronic parts carried in printed circuit board P or printed circuit board P.

[0018] 1st preheating section 10A has heaters H1 and H2 and the circulation fan F1. 2nd preheating section 10B has heaters H3 and H4 and the circulation fan F2. 3rd preheating section 10C has one heater H5 and circulation fan F3. Heaters H1 and H3 are located above the conveyor 16, and heaters H2, H4, and H5 are located in the conveyor 16 bottom. The circulation fans F1, F2, and F3 supply air to each heater, and circulate hot blast. However, the heater corresponding to a fan F3 is only a heater H5. After printed circuit board P's passing along the inside of 1st preheating section 10A of the preheating section 10 - 3rd preheating section 10C from induction 11 by conveyor 16 and going up gradually from a room temperature to predetermined temperature, printed circuit board P reaches the reflow section 12.

[0019] Next, the structure of the reflow section 12 is explained. The reflow section 12 has the heating means 20 and the cooling means 22 roughly, as shown in drawing 1 . The heating means 20 is located in the printed circuit board P bottom, and the cooling means 22 is located in the printed circuit board P bottom. Here, before explaining this reflow section 12, with reference to drawing 9 , the example of a configuration of printed circuit board P put on the induction 11 of the conveyor 16 of drawing 1 is explained.

[0020] Drawing 9 (A) - (D) shows briefly the procedure which are non-heatproof components of carrying the lead components 101,102,103,104, for example, to printed circuit board P. In the solder spreading process of drawing 9 (A), the 1st page of IC package 201 and transistor 202 grade which are the heat-resistant components of printed circuit board P are already first mounted in 310. The cream solder 300 is supplied to a predetermined location from a nozzle 301 to this 1st field 310.

[0021] Next, as shown in drawing 9 (B), printed circuit board P is reversed, 320 [page / 1st] is located in the bottom, and 320 [page / 2nd] is located in the bottom. In this condition, IC package 201 and transistor 202 which are heat-resistant components are located in the bottom, and the cream solder 300 is also located in the bottom.

[0022] Next, as shown in drawing 9 (C), each connection terminal 150 of the lead components 101,102,103,104 which are non-heatproof components is inserted in the hole of printed circuit board P. Each of this connection terminal 150 supports the spreading location of the cream solder 300. As shown in drawing 9 (D), printed circuit board P will pass along between the heating means 20 of the reflow section 12, and the cooling means 22 by such condition.

[0023] Next, the cooling means 22 of the reflow section 12 of drawing 1 is explained. The cooling means 22 of the reflow section 12 has structure as shown in drawing 2 - drawing 6 . As shown in drawing 2 , it has casing 30, the exhaust air means 32, and the air content adjustment device section 34.

[0024] As shown in drawing 2 , drawing 1 , drawing 4 , etc., casing 30 is located in the upper part of a conveyor 16, and in order that the exhaust air means 32 may discharge the air in this casing 30, it has the exhaust air blower 32. Actuation of the exhaust air blower 32 exhausts the air in casing 30 through arrow heads R1 and R2 at the exhaust air blower 32 side from opening 36. That is, from opening 36, as shown in drawing 2 , the air for cooling for cooling the lead components 101,102,103,104 which are non-heatproof components by the side of 2nd page 320 of printed circuit board P can be inhaled in the R1 direction, and the air after the cooling can be led now to works exhaust air facility 32A as shown in drawing 6 by actuation of the exhaust air blower 32 along with R 2-way. The opening 36 of drawing 2 is opening for attracting the open air in casing 30 in this way, and the air content adjustment device section 34 can adjust now opening area 36A of this opening 36.

[0025] The air content adjustment device section 34 shown in drawing 2 and drawing 3 is formed in the upper part of casing 30, and has heat-resistant shields 40 and 42 and guides 44 and 46. As for shields 40 and 42, making from heat-resisting glass is desirable. The thing with desirable using heat-resisting material like heat-resisting glass or the ceramics rather than a metal of these shields 40 and 42 is from the following reasons.

[0026] In drawing 2 , when hot blast HW is not supplied to printed circuit board P from the heating means 20, the heat of the hot blast HW reaches shields 40 and 42. If shields 40 and 42 are made from a metal like iron, radiant heat will arise from the metallic shield, and the shields 40 and 42 will heat the

lead components 101-104 which are non-heatproof components with radiant heat, when thermal conductivity will be immediately heated from a good thing and then printed circuit board P is supplied. And this radiant heat will also lower the cooling effectiveness of the lead components by the cold taken in from opening 36. Shields 40 and 42 can be made from this not with a metal with good thermal conductivity but with heat-resisting glass with low thermal conductivity. Moreover, by making with the heat-resisting glass of transparence, an operator can see the situation of the reflow condition of printed circuit board [from the upper part] P from the lead components 101-104 side which are non-heatproof components.

[0027] The shields 40 and 42 of drawing 3 can adjust opening area 36A of opening 36 by moving in the direction of arrow-head S by driving means 40A and 42A like a motor. Shields 40 and 42 can be guided in the direction of S by straight-line migration with guides 44 and 46. As for driving means 40A and 42A like these motors, the actuation is controlled by the control section 400.

[0028] It sets to drawing 2 , and the inflow part of the open air in casing 30 (cold) sees in the longitudinal section, and has become rectangle-like, and exhaust pipe 30B is prepared in the location of both sides about migration feed direction T of the both-sides part, i.e., printed circuit board P. Therefore, the open air (cold) attracted from opening 36 is sent to the exhaust air blower 32 side through air stack 30B along with R1 and R 2-way. In addition, inhalation-of-air cylinder 36H lead the open air to opening 36.

[0029] Conveyor rail 16A of the conveyor 16 shown in drawing 4 has the function to convey printed circuit board P in the direction of T. By adjusting opening area 36A of opening 36, refrigeration capacity of those lead components can be adjusted according to the number of the lead components carried in printed circuit board P moved by the conveyor 16 etc. If large opening area 36A of opening 36 is taken, the lead components 101-104 can be cooled efficiently, corresponding to the number of the heating situation of hot blast HW, or lead components by the heating means 20 side. Anyway, in consideration of the temperature situation in casing 30 etc., the magnitude of opening area 36A of opening 36 is adjusted, and the lead components 101-104 are cooled in the optimal condition.

[0030] Next, the structure of the heating means 20 of drawing 1 is explained. The heating means 20 shows the structure to drawing 2 , drawing 4 and drawing 5 , and drawing 7 . The heating means 20 of drawing 1 has roughly the sirocco fan 68 as the up heater 67 which is the lower heater 66 and the 2nd heater which are the 1st heater, and fan equipment. The lower heater 66 and the up heater 67 constitute the heater 69. A sirocco fan 68 incorporates external air in the direction of arrow-head V of drawing 5 and drawing 7 , and supplies it from the lower heater 66 bottom. therefore, external air -- the lower heater 66 -- a passage -- further -- the up heater 67 -- passing -- the reflow panel hole 74 of the reflow panel (panel) 72 of drawing 2 -- passing -- as hot blast HW -- the 1st of printed circuit board P -- page 310, i.e., reflow-soldering side, side -- homogeneity -- and it can spray now extensively. As shown in drawing 2 , it escapes from the sprayed hot blast HW to the down side along the direction of arrow-head E. The lower heater 66 and the up heater 67 have Holes 66A and 67A, respectively, and the air from a sirocco fan 68 is heated by the hot blast HW of predetermined temperature from the air of a room temperature by passing through these holes 66A and 67A one by one.

[0031] As shown in drawing 2 , the reflow panel 72 mentioned above is arranged on the up heater 67. As shown in this reflow panel 72 at drawing 10 , the homogeneity array of the reflow panel hole 74 is carried out at the shape for example, of a grid. These reflow panel holes 74 change into a shower condition the hot blast HW which escaped from the up heater 67, and spray it on homogeneity extensively to the 1st page (reflow-soldering side) 310 side of printed circuit board P. thus, the cream solder 300 located in the part of each connection terminal 150 of the lead components 101-104 as by spraying hot blast HW on the 1st page 310 side of printed circuit board P in the shape of a shower shows to drawing 9 (D) -- homogeneity -- heating -- cream solder -- using -- the connection terminal 150 -- wiring of printed circuit board P -- it is electrically connectable with a conductor.

[0032] Next, the cooling section 14 of drawing 1 and drawing 8 is explained. The cooling section 14 has cooling fans 14A and 14B. Two cooling-fan 14A is prepared along the cross direction of a conveyor 16, and two lower cooling-fan 14B is similarly arranged along the cross direction of a conveyor 16 too.

Printed circuit board P after the reflow processing which appeared in the conveyor 16 can be cooled because these cooling fans 14A and 14B operate. In addition, it can be made to rotate in the direction of arrow-head J, and cooling fans 14A and 14B can adjust the sense of a wind, as shown in drawing 8 (A), respectively.

[0033] Next, how to carry out soldering processing to printed circuit board P as shown in drawing 9 </A> and drawing 2 is explained using the soldering equipment mentioned above. Printed circuit board P as shown in drawing 9 (C) is put on the conveyor 16 of drawing 1 so that the lead components 101-104 may turn up. Printed circuit board P is moving in the direction of T from the induction 11 of the conveyor 16 of drawing 1 , and goes up gradually from a room temperature to predetermined temperature by 1st preheating section 10A of the preheating section 10, 2nd preheating section 10B, and 3rd preheating section 10C. Thereby, activation of the cream solder 300 which is printed circuit board P, relaxation of the stress of the various electronic parts carried, and reflow solder is performed.

[0034] when a conveyor 16 moves printed circuit board P to the reflow section 12 side from the preheating section 10, the heating means 20 of the reflow section 12 is shown in drawing 2 and drawing 9 (D) -- as -- hot blast HW -- homogeneity -- and -- overall -- supplying -- printed circuit board P -- while heating 310 [page / 1st / (reflow-soldering side)], the 2nd page 320 side of printed circuit board P is cooled with the cooling means 22.

[0035] The sirocco fan 16 of the heating means 20 shown in drawing 2 and drawing 7 adopts air in the direction of arrow-head V, and sends it into the lower heater 66 side. Thereby, this air is heated by predetermined temperature at the lower heater 66 and the up heater 67, and hot blast HW is sprayed on the cream solder 300 by the side of 1st page 310 of printed circuit board P from the hole 74 of the reflow panel 72. thereby -- the cream solder 300 -- melting -- the connection terminal 150 of the lead components 101 -- wiring of printed circuit board P -- it is electrically connectable to a conductor.

[0036] It can come, simultaneously the cooling means 22 of drawing 2 and drawing 9 (D) is cooled by incorporating the open air to the lead components 101,102,103,104 which are non-heatproof components. Namely, from opening 36, external air is incorporated in the direction of arrow heads R1 and R2. The exhaust air blower 32 is operated on the occasion of the send of this air. Since the air which is cold by this flows in the direction of R1 and R2 from opening 36, it cools the lead components 101-104 whose flow of this air is non-heatproof components. In this case, when the air content adjustment device section 34 adjusts opening area 36A of opening 36 suitably, cooling temperature in casing 30 can be adjusted. Factors, such as components mark of the lead components 101-104 which are non-heatproof components, and temperature defined beforehand, adjust adjustment of this temperature. Thus, while the 1st page 310 side of printed circuit board P is heated by hot blast HW, 2nd page 320 side will be cooled by the air which flows from opening 36.

[0037] In this case, since it is preferably made by heat-resisting glass, the shields 40 and 42 which form opening 36 cannot generate radiant heat easily compared with a heat-resistant ingredient and the case where a metallic shield is used. That is, since a shield 40 is hard to be heated by the heat by hot blast HW and it is moreover cooled from opening 36 to air by using bad thermally conductive heat-resisting glass etc. compared with using a thermally conductive good metal shield, shields 40 and 42 prevent generating of the radiant heat to the lead components 101-104. This is easier to perform the temperature control in casing 30.

[0038] It moves from printed circuit board P by which reflow processing was carried out as mentioned above in the reflow section 12 to the cooling section 14 of drawing 1 , and an activity ends the cooling fans 14A and 14B of the cooling section 14 by cooling this printed circuit board P. In this case, cooling fans 14A and 14B can heighten that cooling effect more, if an include angle is changed like drawing 8 . Thus, in a reflow zone, only 310 [page / 1st / (soldering side)] is heated, reflow processing can be efficiently performed by [of printed circuit board equipped with lead components which are non-heatproof components] cooling 320 [page / 2nd], and a phenomenon which the lead components which are heat-resistant components damage with heat can be abolished.

[0039] As for the function which can supply the hot blast to homogeneity, the reflow panel 72 shown in drawing 2 will not be influenced like a difference, even if solder falls to the reflow panel 72 side while

being able to heat the 1st page 310 side of printed circuit board P to homogeneity since it has many reflow panel holes 74. And since the reflow panel 72 cannot be concerned with the format of printed circuit board P, i.e., the loading gestalt of components, but can supply hot blast to homogeneity also to reflow processing of which kind of printed circuit board P, it is unnecessary, and its working capacity improves. [of exchange of a reflow panel] Moreover, a heater can heighten heater heating capacity by constituting at an up heater and a lower heater. Even if it makes it this heater have an up heater and not only a lower heater but three or more heater parts, of course, it is not cared about.

[0040] IC package 201 of drawing 2 which is heat-resistant electronic parts the 1st page (reflow-soldering side) as shown in 310 at drawing 9 (D), and the transistor 202 grade are shown. In the gestalt of operation of this invention, although heat-resistant components are IC packages, transistors, etc. which were mentioned above, they are SOP (Small Outline Package), QFP (Quad Flap Package), etc., for example as an IC package. On the other hand, as lead components of non-thermal resistance carried in the 2nd page 320 side of printed circuit board P of drawing 2 , there are components, such as semipermanent volume, an air-core coil or a chemical capacitor, and a transformer.

[0041] By the way, this invention is not limited to the gestalt of the above-mentioned implementation. With the gestalt of operation mentioned above, while the conveyor 16 of drawing 1 moves printed circuit board P, it is made to perform processing between the cooling means 22 of the reflow section 12, and the heating means 20. However, it is made to stop once and not only this but printed circuit board P may be made to perform heating and cooling processing between the cooling means 22 and the heating means 20. The hole of the reflow panel 72 of drawing 2 may be a hole of not only the hole of a circle configuration but the shape of a slot or a slot, or it is replaced with a hole and you may make it prepare the nozzle of a slot mold, or the nozzle of a circle configuration. Although the preheating section 10 of drawing 1 has a part for the heating unit of the three-stage of 1st preheating section 10A - 3rd preheating section 10C, it may have not only this but 1, 2, or the four or more preheating sections.

[0042]

[Effect of the Invention] The soldering section of a substrate can be heated efficiently, cooling efficiently the components of non-thermal resistance carried in the substrate according to this invention, as explained above.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] Drawing showing the gestalt of desirable operation of the soldering equipment of this invention.
[Drawing 2] The sectional view showing the structure of the reflow section of the soldering equipment of drawing 1 .
[Drawing 3] The perspective view showing the example of the air content adjustment device section of the reflow section.
[Drawing 4] The sectional view showing the reflow section.
[Drawing 5] The sectional view which showed the reflow section and was along the flow direction of a printed circuit board.
[Drawing 6] Drawing showing the exhaust air means of the reflow section etc.
[Drawing 7] Drawing showing the heating means of the reflow section.
[Drawing 8] Drawing showing the cooling section.
[Drawing 9] Drawing showing an example of the printed circuit board put on the conveyor of drawing 1 .
[Drawing 10] The top view showing an example of a reflow panel.
[Drawing 11] Drawing showing the conventional reflow furnace.
[Drawing 12] Drawing showing an example of the conventional reflow process.
[Description of Notations]
10 ... The preheating section, 12 ... The reflow section, 14 ... Cooling section, 20 ... The heating means of the reflow section, 22 ... The cooling means of the reflow section, 30 ... Casing, 32 ... An exhaust air blower (exhaust air means), 34 ... Air content adjustment device section, 36 ... 40 Opening, 42 ... A shield, 66 ... Lower heater (the 1st heater), 67 [... Lead components (non-heatproof components), 310 / ... The 1st page of a printed circuit board, 320 / ... The 2nd page of a printed circuit board, P / ... Printed circuit board (substrate)] ... An up heater (the 2nd heater), 72 ... A reflow panel, 74 ... A reflow panel hole, 101-104

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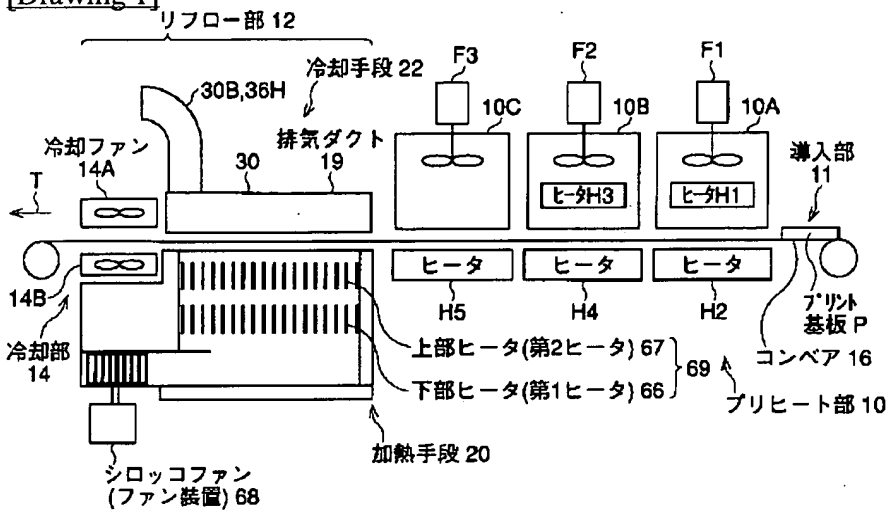
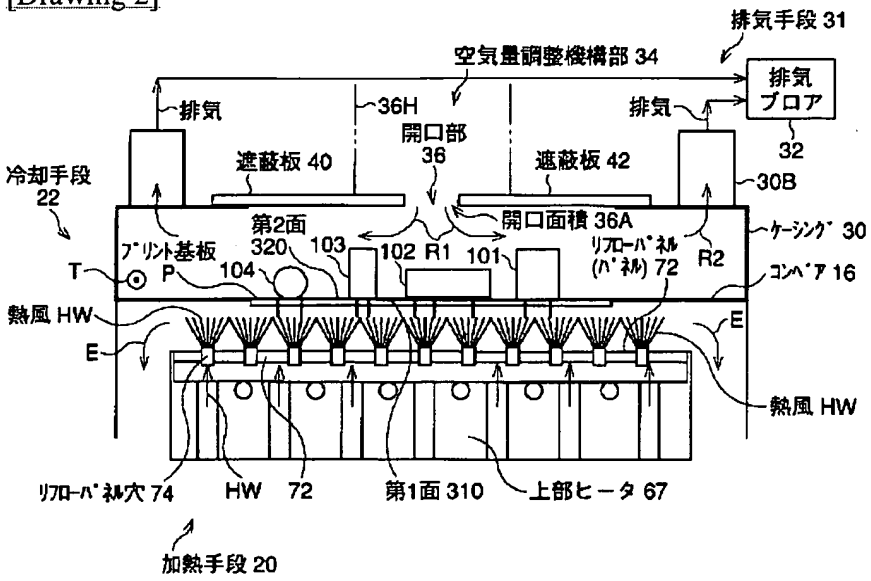
DRAWINGS

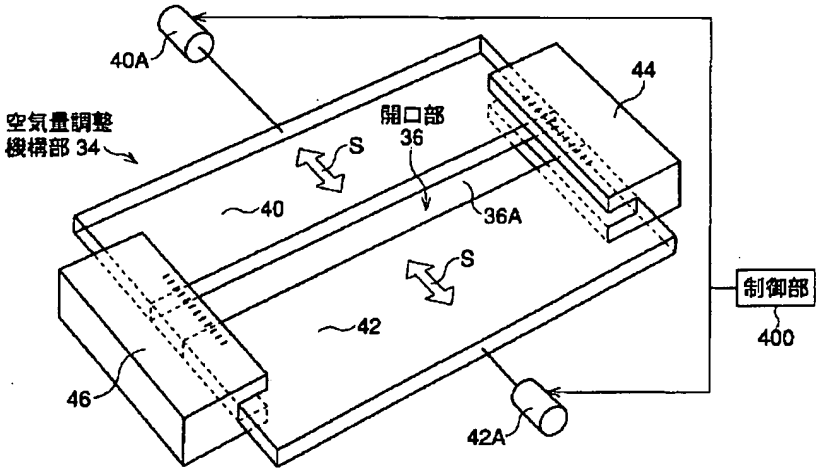
[Drawing 1]



[Drawing 2]



[Drawing 3]



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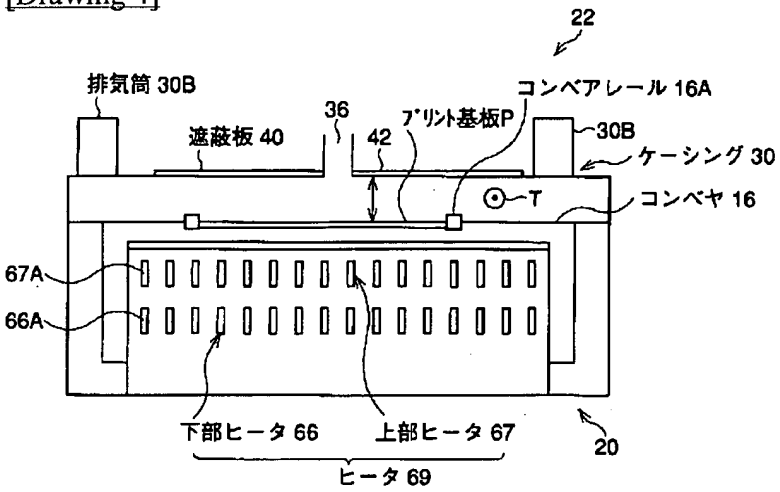

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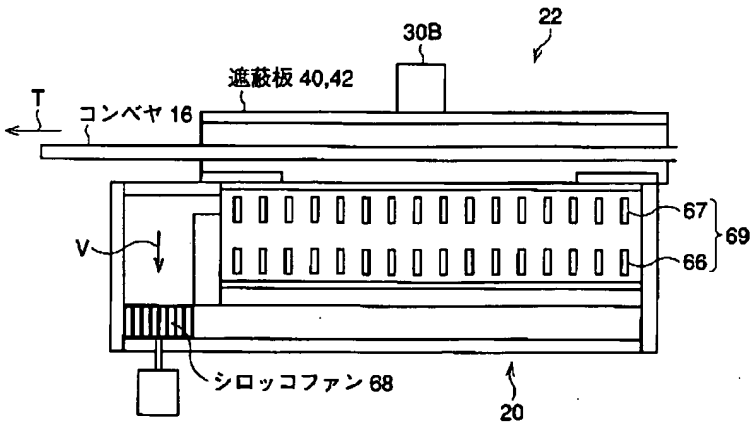

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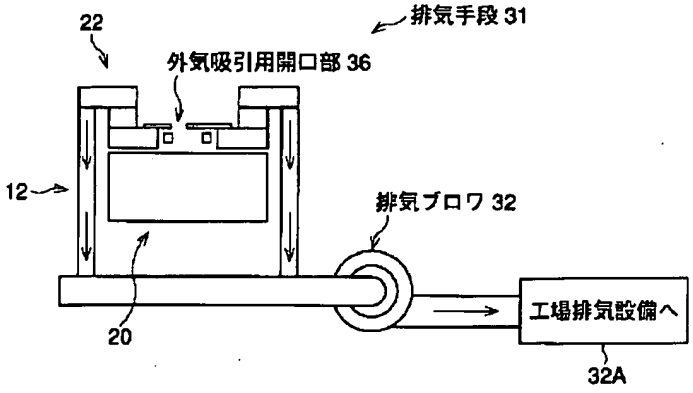

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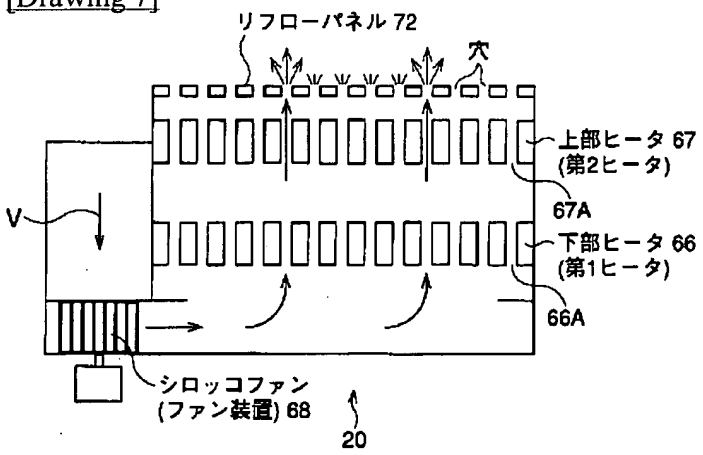
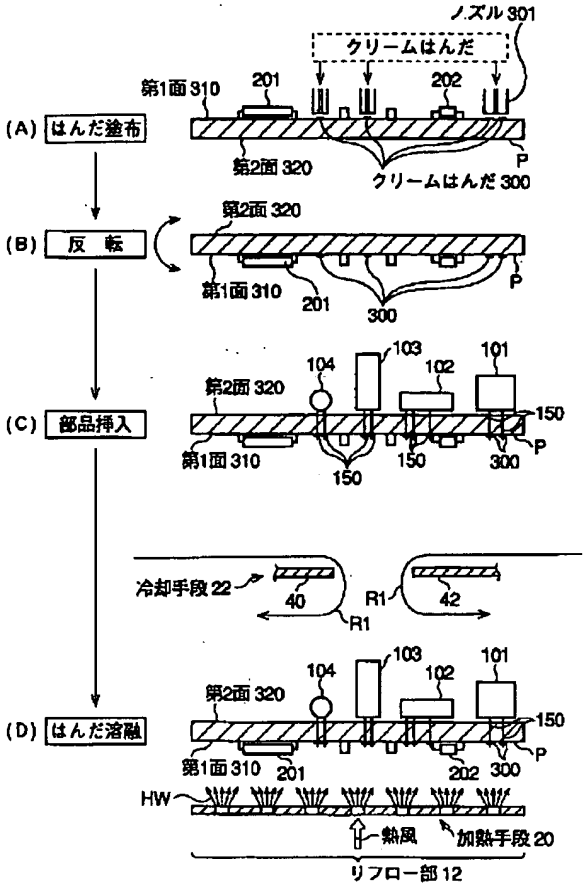
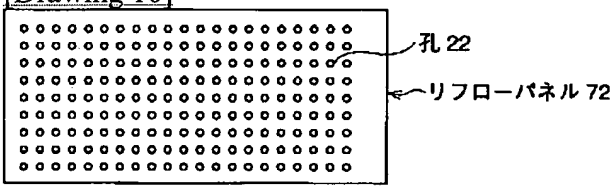


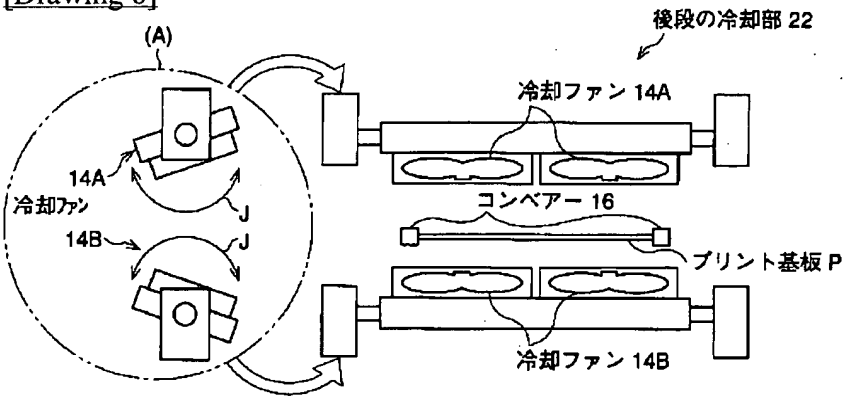
[Drawing 9]



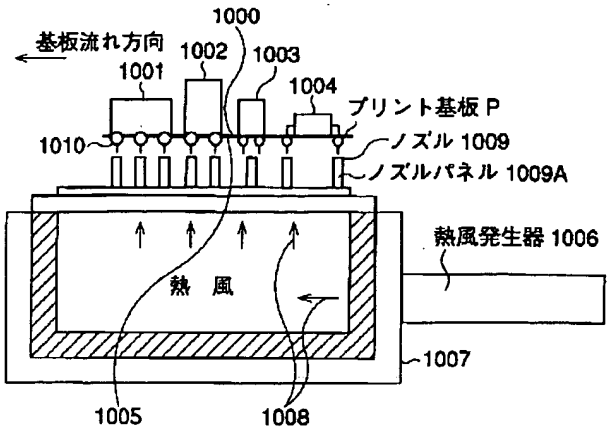
[Drawing 10]



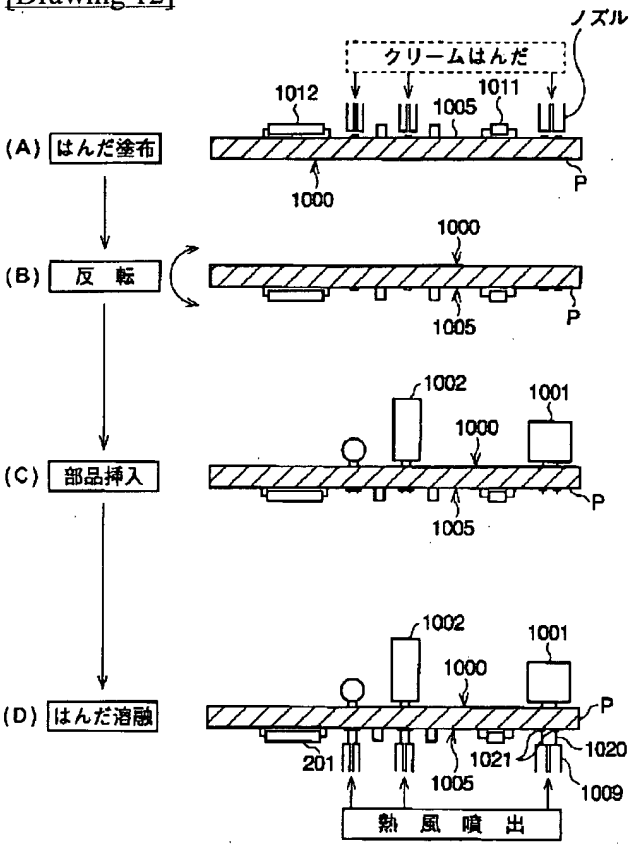
[Drawing 8]



[Drawing 11]



[Drawing 12]



[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] A heating means to be soldering equipment which heats the soldering section of the components of non-thermal resistance in order to connect the components of non-thermal resistance of a substrate electrically, and to supply and heat hot blast extensively to the 1st page side by the side of the soldering section of the components of non-thermal resistance of a substrate, It is soldering equipment which is equipped with a cooling means to cool the 2nd page side which is a field in which the components of non-thermal resistance of a substrate were carried, and is characterized by a cooling means having the air content adjustment device section for adjusting the air content for cooling the components of non-thermal resistance taken in from the outside in opening area.
[Claim 2] A cooling means is soldering equipment according to claim 1 which has an exhaust air means for supplying the air for external cooling to the 2nd page side of a substrate by exhausting the inside of casing and this casing.
[Claim 3] A heating means is soldering equipment according to claim 1 which has the panel which has many holes, a heater for supplying hot blast to the 1st page side of a substrate extensively, and heating it through the hole of this panel, and fan equipment for air delivery which sends air into this heater.
[Claim 4] A heater is soldering equipment according to claim 3 which has the 1st heater which heats air, and the 2nd heater which heats further the air heated at the 1st heater.
[Claim 5] It is soldering equipment according to claim 2 this shield of whose the air content adjustment device section of a cooling means moves a heat-resistant shield, adjusts opening area, the air content taken in from the outside by actuation of an exhaust air means is adjusted, and is a product made from heat-resisting glass.
[Claim 6] A heating means and a cooling means are soldering equipment according to claim 1 arranged in the latter part of the preheating section which is used for reflow soldering and heats a substrate beforehand.
[Claim 7] In order to connect the components of non-thermal resistance of a substrate electrically, in case the soldering section of the components of non-thermal resistance is heated, while supplying and heating hot blast extensively to the 1st page side by the side of the soldering section of a substrate The soldering approach characterized by adjusting the air content for cooling the components of non-thermal resistance taken in from the outside in case the 2nd page side which is a field in which the components of non-thermal resistance of a substrate were carried is cooled in opening area.
[Claim 8] The soldering approach according to claim 7 which is reflow soldering performed in the latter part of the preheating section which heats a substrate beforehand.

[Translation done.]